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PROGRAMME OF EXAMINATIONS FOR 1863.

PRELIMINARY NOTICE.

I. Any person, male or female, not under sixteen years of age, may undergo the Examinations described in the following Programme. They were established to encourage, test, attest, and reward efforts made for self-improvement by adult members and students of the Mechanics' Institutions, Athenæums, People's Colleges, Village Classes, and other Educational Bodies of the like character, in Union with the Society of Arts. Such members and students are commonly mechanics, artisans, labourers, clerks, tradesmen and farmers not in a large way of business, apprentices, sons and daughters of tradesmen and farmers, assistants in shops, and others of various occupations, who are not Graduates, Undergraduates, or Students of a University, nor following nor intending to follow a learned profession, nor enjoying nor having enjoyed a liberal education. To all such members and students, and also to persons of the like condition in places where there are no Institutions able to enter into the Union, the Examinations, Certificates, and Prizes (see page 618) are offered by the Society of Arts. See paragraph 1 (*A. B. C.*), next page.

II. Teachers and Pupil Teachers may be examined and receive Certificates, but cannot compete for Prizes.

III. Persons of a different grade in society, though their admission to the Examinations with the view of obtaining Certificates is provided for, cannot compete for Prizes. See paragraph 1 (*D*).

LIST OF SUBJECTS AND EXAMINERS FOR 1863.

*** Candidates, before choosing their subjects, should refer to the Time-table, at page 614.

1.	Arithmetic	Rev. Alexander Wilson, M.A., National Society, London.
2.	Book-keeping	John Ball, Esq., of the firm of Messrs. Quilter and Ball.
3.	Algebra	J. J. Sylvester, Esq., M.A., F.R.S., Professor of Mathematics at the Royal Military Academy, Woolwich.
4.	Geometry	Rev. B. Morgan Cowie, M.A., Professor of Geometry at Gresham College; one of H.M. Inspectors of Schools.
5.	Mensuration	John Sykes, Esq., M.A., Fellow of Pembroke College, Cambridge, Assistant-Secretary to the Committee of Privy Council on Education.
6.	Trigonometry	Rev. T. G. Hall, Professor of Mathematics in King's College, London.
7.	Conic Sections	Rev. Bartholomew Price, M.A., F.R.S., Sedleian Professor of Natural Philosophy in the University of Oxford.
8.	Navigation and Nautical Astronomy	John Riddle, Esq., F.R.A.S., Head Master of the Nautical Schools, Greenwich.
9.	Principles of Mechanics	Rev. Jonathan Bates, M.A., Fellow of Gonville and Caius College, Cambridge.
10.	Practical Mechanics	T. M. Goodeve, Esq., Professor of Mechanics at the Royal Military Academy, Woolwich
11.	Electricity, Magnetism, and Heat	Charles Brooke, Esq., M.A., F.R.S., Surgeon to the Westminster Hospital.
12.	Astronomy	James Glaisher, Esq., F.R.S., Royal Observatory, Greenwich.
13.	Chemistry	A. W. Williamson, Esq., Professor of Chemistry, University College, London.
14.	Animal Physiology (in relation to Health)	John Marshall, Esq., F.R.S., F.R.C.S., Surgeon to the University College Hospital, and Lecturer on Anatomy in the Government Department of Science and Art.
15.	Botany	Dr. Lindley, F.R.S., Professor of Botany in the University of London, and Hon. Sec. of the Royal Horticultural Society.
16.	Agriculture	J. C. Morton, Esq.
17.	Mining and Metallurgy	J. Arthur Phillips, Esq., Civil Engineer, Graduate of the Imperial School of Mines of France, &c.
18.	Political and Social Economy	Charles Neate, Esq., M.A., Professor of Political Economy in the University of Oxford.
19.	Domestic Economy	The Very Rev. Richard Dawes, F.R.S., Dean of Hereford.
20.	Geography	Wm. Hughes, Esq., F.R.G.S., Professor of Geography in Queen's College, London.
21.	English History	C. H. Pearson, Esq., M.A., Professor of Modern History, King's College, London.
22.	English Literature	Rev. Samuel Clark, M.A., F.R.G.S., Principal of the Training College, Battersea, *Chairman of the Board.*
23.	Logic and Mental Science	The Right Rev. Wm. Thomson, D.D., Lord Bishop of Gloucester and Bristol.
24.	Latin and Roman History	Rev. F. Temple, D.D., Head Master of Rugby School.
25.	French	Alphonse Mariette, Esq., M.A., Professor of French, King's College, London.
26.	German	Dr. Bernays, Professor of German, King's College, London.
27.	Freehand Drawing	F. S. Cary, Esq.
28.	Geometrical Drawing	Thomas Bradley, Esq., Professor of Geometrical Drawing in King's College, London.
29.	Theory of Music	John Hullah, Esq.

Terms of Admission to the Examinations.

1. Every Candidate for Examination must be admitted through a Local Educational Board connected with the Society of Arts, and be at least sixteen years of age.

(*A.*) Members of, or students of classes in, Institutions in direct Union with the Society of Arts, are admitted	Free.
(*B.*) Members of, or students of classes in, "Small Institutions"* not in direct Union with the Society of Arts, but connected with a Provincial Union that is "in Union" with the Society, are admitted on payment of a fee of	2s. 6d.
(*C.*) In districts where there are no Institutions at all, or only "small Institutions,"* Local Educational Boards, paying one guinea a year to the Society of Arts, may admit candidates on payment of a fee of	2s. 6d.
(*D.*) Persons of a higher class of society than those described in paragraph 1 (Preliminary Notice), are admitted to the Examinations on payment of a fee of..................................	10s. 6d.

N.B.—The Council in every case leave it to the Local Board to decide whether a candidate should pay this fee.

2. Candidates coming under the head (*D*), as well as Teachers and Pupil Teachers, though they may be examined and receive certificates, cannot compete for the prizes of which details are given at page 618.

3. In any locality, whether there be an Institution in union with the Society of Arts or not, the first thing to be done to enable any person to take advantage of the Society's Examinations, is to form a Local Educational Board.

Local Educational Boards.†

4. The Managers of Institutions in Union with the Society of Arts, and other persons desirous to co-operate with the Society in promoting the instruction of adults, are invited to form Local Boards. Each Local Board must consist of at least three members; and, with advantage, may be much more numerous. There must be a Chairman and a Secretary. The district for which the Board is to act should be defined; and every Educational Institution‡ within those limits ought to be represented in the Board. It is of importance that each Local Board should include the representatives of more Institutions than one, and that there should not be more than one Local Board in each locality. The composition of the Board must be such as to command the respect and confidence of the neighbourhood. Where gentlemen of high literary and scientific attainments are willing to serve on the Board, their services are of great value; but the necessary work may be done by any well-educated persons of high character and good sense. No member of a Local Board can be a candidate for examination.

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Whenever this is the case, the names and addresses of the members, both of District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

6. Local Educational Boards in connection with the Society of Arts need make no payment to the Society, unless they desire to exercise the power of admitting candidates (see par. 1 *C.*) where there are no Institutions in union with the Society of Arts; in which case a subscription of one guinea a year must be paid.

7. The Society's system of Examinations consists of (1) Previous Examinations by the Local Boards, and (2) Final Examinations by the Examiners of the Society of Arts, under the supervision of the Local Boards.

8. ⁂ A Central Committee of Educational Unions and Adult Education Societies, in connexion with the Society of Arts, has been formed to promote uniformity of action and a fixed Standard in the Elementary and Previous Examinations which are held by the Provincial Unions, Adult Education Societies, and Local Boards connected with the Society of Arts. See present vol. of *Journal*, page 539.

Previous Examinations by the Local Boards.

9. These Examinations are (1) to test the handwriting and spelling of the Candidates, their knowledge of English Grammar, composition, and the common rules of arithmetic, and (2) to ascertain whether their knowledge of those special subjects in which they seek to be examined by the Society's Examiners is such as to offer a fair prospect of their obtaining certificates. The previous Examinations may be either wholly written, or partly oral and partly written, at the discretion of each Local Board.

10. Handwriting.—A bold, even, round hand, without loops, long tails, or flourishes, should be preferred.

11. Spelling, English Grammar, and Composition.—An extract from some standard English author should be set, into which a few errors of spelling, grammar, and punctuation should be introduced. Some faulty grammatical constructions in common use, and vulgarisms, should be submitted for correction.

12. Arithmetic.—A knowledge of the elementary rules, including the Rule of Three, should be required.

13. No candidate can be admitted to the Final Examination without a certificate (see Form No. 4 in Appendix) from his Local Board, that he has satisfactorily "passed" its previous Examination in the elementary subjects specified in paragraphs 10, 11, and 12, and in the special subjects in which he wishes to be examined by the Society's Examiners. If, in any case, a Local Board should be unable itself to examine a Candidate in a special subject, it will be sufficient if that Board notify the fact in the Form No. 4, and add therein that the Board believes the Candidate to be fit to be examined in that subject by the Central Board. N.B.—This relaxation does not apply to music. [See page 359, respecting Central Committee.]

14. The previous Examinations must be held by the Local Boards sufficiently early in the year 1863 to allow the results to be communicated to the Council, on a Form which will be furnished on application (see Form No. 2 in Appendix), on or before the 1st April, when the required number of copies of Form No. 4 will be forwarded to each Local Board. These should be filled up and returned by the 7th April, *i.e.*, four weeks before the commencement of the Final Examinations.

15. Unreserved communications between the Society and the Local Boards will be requisite to secure to the "passes" of the various Local Boards throughout the Union such an uniformity of value as may be attainable.

Final Examination by the Society's Examiners.

16. The Forms (see Form No. 4, in Appendix, containing the names of the "passed" candidates, and the subjects in which they desire to be examined, having

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* Small Institutions are defined as those which have an income of less than £75 a year.

† For a list of the Boards already formed, with the names of the Secretaries, see page 619.

‡ These Educational Boards, besides superintending the Examinations of the Society of Arts, may advantageously assist in promoting various other plans for the furtherance of Education in their districts; it is, therefore, desirable that they should include representatives not only from the various Institutions for the promotion of adult instruction, but also from the principal schools in the locality.

been returned to the Secretary of the Society of Arts, by the 7th April, 1863, the printed papers of questions in the various subjects will be prepared by the Society's Examiners, and will be forwarded to the Secretaries of the Local Boards.

17. The whole of the papers appointed for each of the evenings of the Examination, according to the subjoined Time-table, with the required number of Forms of Declaration (Form No. 8), will be contained in a separate sealed envelope, which is not to be opened till the Candidates are present, at half-past six on that evening.

18. The details of the mode in which the Final Examinations are to be conducted, are given in the "Letter of Instructions," (see Form No. 6, in Appendix), and every member of each Local Board should make himself thoroughly acquainted with them.

19. The Final Examinations must be held *simultaneously on the days and at the hours specified in the following Time-table*, at those places where Local Boards are established.

20. In choosing the subjects in which they desire to be examined, candidates must take notice of the arrangements of this Time-table, as they *cannot* be examined in *two* subjects which are set down for the *same* evening.

Time Table for 1863.

No Candidate may work more than one paper on each evening, and each paper must be worked on the particular evening appointed for it.

Tuesday, the 5th May, From 6.30 to 9.30 p.m.	Wednesday the 6th May, From 6.30 to 9.30 p.m.	Thursday, the 7th May, From 6.30 to 9.30 p.m.	Friday, the 8th May, From 6.30 to 9.30 p.m.
Arithmetic. Trigonometry. Magnetism, Electricity, and Heat. Agriculture. Mining and Metallurgy. Geometrical Drawing. German.	Book-keeping. Navigation and Nautical Astronomy. Conic Sections. Chemistry. Music. Domestic Economy. English History.	Algebra. Practical Mechanics. Astronomy. Animal Physiology. Political and Social Economy. French. *English Literature.	Geometry. Mensuration. Principles of Mechanics. Botany. Geography. Latin. Logic and Mental Science. Freehand Drawing.

* Two Papers of one hour and a half each in this subject are condered as one.

21. The Local Boards must see, and certify to the Council, in the form which the Council will furnish (see Appendix, Form No. 8), that the papers are fairly worked by each candidate, without copying from any other, and without books or other assistance; and must seal up and return the worked papers to the Council *immediately* on the close of each evening's Examination. The papers will then be submitted to the judgment of the Examiners, and certificates of three grades will be awarded.

22. The names of the candidates who obtain Prizes and Certificates will be published in the *Journal of the Society of Arts*, as soon as the Examiners have pronounced their judgment, and the Prizes and Certificates will subsequently be forwarded to the Local Boards for distribution.

23. A candidate who has obtained from the Society a certificate of the 1st class in any subject, cannot again be examined in the same subject.

24. A candidate who has obtained a certificate of the 2nd or 3rd class may, on the recommendation of the Local Board, be examined in the same subject, in a subsequent year, without again passing the Previous Examination, but the name must always be returned in the proper form (No. 4 in the Appendix.)

25. A candidate who, having obtained a certificate in any subject, desires to be examined in some other subject, in a subsequent year, may be "passed" by the Local Board, after examination in that subject, without re-examination in the elementary subjects specified in paragraphs 10, 11, 12.

SUBJECTS FOR EXAMINATION FOR 1863.

26. In the following paragraphs will be found a brief outline of the portions of the respective subjects in which the candidates will be examined, and their attention is especially drawn to this part of the programme. Though in most instances the Examiner has set down certain Text-books, in so doing he pronounces no opinion as to their merit. Real knowledge, however or wherever acquired, will be accepted by the Examiners.

I.—Arithmetic.

27. Practice—Simple and Compound Proportion—Interest—Discount—Insurance—Vulgar and Decimal Fractions; with the principles of a Decimal Notation in money on the basis of the pound unit.

28. The questions framed from the preceding syllabus will consist mainly of practical problems, and the Examiner will take into account not only the correctness of the answers, but also the excellence of the methods by which they are worked out, and the clearness and neatness of working, which must always be shown.

29. Text Books:—Any of the modern treatises on Arithmetic, such as Hunter's Text Book (*National Society*) Colenso (*Longmans*), or Barnard Smith (*Macmillan*).

II.—Book-keeping by Double Entry.

30. Candidates should be prepared to answer questions as to the nature and use of the different books usually kept in a merchant's office. They should be prepared to journalize a series of transactions from a waste book, and, having posted the entries to the ledger, to balance the accounts, to prove the correctness of the postings by a trial-balance, and finally to exhibit an account of profit and loss, and a balance sheet.

31. Candidates should be prepared to draw the usual commercial forms, such as receipts, bills of exchange, promissory notes, invoices, account sales, accounts current, bills of parcels, and to explain the meanings of technical terms used in general business.

32. Text Books:—Book-keeping—Irish School Series, (*Groombridge.*)
Rudimentary Book-keeping, (*Weale's Series.*)
Kelly's Elements of Book-keeping, (*Simpkins and Co.*)

III.—Algebra.

33. Elementary Operations and Fractions. Simple and Quadratic Equations and Problems leading to them. Involution and Evolution. Surds. Arithmetical and Geometrical Series. Combinations and Permutations. Binomial Theorem.

34. Text Books:—Todhunter's Algebra (*Macmillan*); Colenso's Algebra (*Longmans*), Lund's or any other modern treatise on Algebra.

IV.—Geometry.

35. A facility in solving geometrical theorems and problems, deducible from the first six books of Euclid, will be expected on the part of those who desire to obtain certificates of the first or second class.

36. Text Book:—Euclid, Books I., II., III., IV., VI., XI., as far as Prop. 21; Potts' smaller edition (*Parker*).

V.—Mensuration.

37. The calculation of the areas and circumferences of plane figures bounded by arcs of circles or right lines, and solid contents of cones, cylinders, spheres, &c. Candidates will be expected to be familiar with the different rules for measuring and estimating artificers' work, such as joiners', bricklayers', masons', and plumbers' work, and to be able to prepare estimates of such work from given quantities.

38. Text Books:—Lund's Mensuration, Part III., of his Elements of Geometry and Mensuration. Tate's Mensuration. Young's Treatise on Mensuration (*Simms and M'Intyre*).

VI.—TRIGONOMETRY.

39. In Plane Trigonometry, the formulæ for the trigonometrical functions of the sum of two angles, the numerical solution of plane triangles, and the use of logarithmic tables, &c.

40. Spherical Trigonometry, Napier's Rules, Solution of Spherical Triangles.

41. Text Books:—Snowball's Trigonometry (*Macmillan*), Hall's Trigonometry for Schools (*Christian Knowledge Society*), or any of the modern treatises on Algebraical Trigonometry. Mathematical Tables (*Chambers' Series*).

VII.—CONIC SECTIONS.

42. The properties of the three curves treated geometrically; also as deduced from the cone. The principles of projection, orthogonal and central, applied to derive the properties of the Conic Sections from those of the circle.

43. Analytical Conics, including the equations of the straight line, the circle, the three conic sections, and the general equation of the second degree.

44. Text Books:—Puckle's Conic Sections (*Macmillan*). Todhunter's Conic Sections (*Macmillan*). Salmon's Conic Sections (*Longmans*). Drew's Conic Sections (*Macmillan*). Whewell's Conic Sections (*Parker*).

VIII.—NAVIGATION AND NAUTICAL ASTRONOMY.

45. A good knowledge of Plane and Spherical Trigonometry, of the definitions and terms used in Nautical Astronomy, and of the various measurements of time and their mutual conversions will be required, as well as skill in the use of logarithmic tables, and neatness, order, and accuracy in the numerical solutions of problems. The candidate should understand the construction of charts; the nature and laws of circular storms; great circle sailing, &c.; the methods of determining the latitude, longitude, variation of the compass, and error and rate of a chronometer by astronomical observations, with the demonstrations of the formulæ employed; the use of Nautical Astronomical Instruments, &c.

46. Text Books:—The Nautical Almanac, (*Murray*.) Riddle's Navigation and Nautical Astronomy, (*Law*, Essex-street.)

IX.—PRINCIPLES OF MECHANICS.

47. The properties of matter, solid, fluid, and gaseous.

48. Statics: The composition, resolution, and equilibrium of pressures acting on a material particle; constrained particles; machines; attractions.

49. Dynamics: Gravitation; collision; constrained motions, projectiles; oscillations.

50. Rigid Dynamics: Motion of a rigid body about a point; —of a free rigid body;—of a system of rigid bodies.

51. Hydrostatics: Pressures of fluids; equilibrium of floating bodies; specific gravity; elastic fluids; machines; temperature and heat; steam; evaporation.

52. Hydrodynamics: Motion and resistance of fluids in tubes, &c.; waves and tides.

53. Pneumatics: Mechanical properties of air; the barometer.

54. Text Books:—Todhunter's Statics, or Parkinson's Mechanics. Goodwin's Mathematics. Miller's, Phear's, or Webster's Hydrostatics. Webster's Theory of Fluids. The treatise on this subject in Orr's Circle of the Sciences. Golding Bird's Elements of Natural Philosophy, by C. Brooke, (*Churchill*.) Lardner's Handbooks on Natural Philosophy.

X.—PRACTICAL MECHANICS.

55. The Application of the Principles of Mechanism to Simple Machines. The Steam Engine.

56. Text Books:—Lardner on the Steam Engine. Scott Russell on the Steam Engine. Nasmyth's Elements of Mechanism, with remarks on Tools and Machinery, (*Weale*.) Goodeve's Elements of Mechanism, (*Longmans*.)

XI.—MAGNETISM, ELECTRICITY, AND HEAT.

57. Construction and Properties of Magnets; Magnetic Instruments; Terrestrial Magnetism; Diamagnetism.

58. Statical or Franklinic Electricity; Voltaic Electricity; Electro-dynamics; Electro-telegraphy; Electro-metallurgy; Thermo-Electricity; Organic Electricity.

59. Conduction, Convection, and Radiation of Heat; Instruments for measuring Heat; Specific and Latent Heat; Reflection and Refraction of Heat; Diathermancy.

60. Text Books:—Golding Bird's Elements of Natural Philosophy, by C. Brooke, (*Churchill*.)

Lardner's Handbooks of Natural Philosophy, (*Walton and Maberley*.)

Herschel's Discourse on the Study of Natural Philosophy (*Longmans*) for a *general* view of the subjects.

XII.—ASTRONOMY.

61. The Principles of Plane Astronomy.

62. Text Books:—Herschel's Astronomy, (*Longmans*.) First chapters.

Airy's Lectures on Astronomy.

Maddy's Elements of Astronomy.

Practical Astronomy, (Orr's Circle of the Sciences).

XIII.—CHEMISTRY.

63.—Inorganic. Chemistry of the metalloids and metals, laws of combining proportions, volumes of gases, vapours, &c.

Organic. Compositions, properties, and decompositions of alcohols, acids, &c.

64. Candidates are expected to be able to explain decompositions by the use of symbols. Questions illustrative of general principles will be selected from the following, amongst other trades and manufactures: Metallurgy of Lead, Iron, and Copper; Bleaching, Dyeing, Soap-boiling, Tanning; the manufacture of Coal-Gas, Sulphuric Acid, &c.

65. Text Books:—Fownes' Manual of Elementary Chemistry. Miller's Elements of Chemistry.

XIV.—ANIMAL PHYSIOLOGY, IN RELATION TO HEALTH.

66. The general principles of Animal Physiology, and the application of them to the preservation of health and to the wants and emergencies of daily life.

67. Text Books:—Carpenter's Animal Physiology, 1859, (*Bohn*.)

Lardner's Animal Physics, (*Walton and Maberly*.)

Translation of Milne Edward's Manual of Zoology, (*Renshaw*.)

Marshall's Description of the Human Body, with Atlas (*Day and Sons*), for details of Anatomy.

XV.—BOTANY.

68. Sect. I. Vegetable Physiology. The general Structure of a Plant. The manner in which the organs perform their several functions; and the influence exercised by external agents. The nature of their principal tissues. The application of such facts to practical purposes.

69. Text Books:—Lindley's Theory and practice of Horticulture (*Longmans*); or the same author's School-Botany, the edition of 1854, or any later one. (*Bradbury and Evans*.)

70. Sect. II. Practical Botany. The meaning of Botanical Terms. The general facts relating to Botanical Classification, excluding that of Linnæus. The Distinctions of some of the principal English Natural Orders of Plants *not* Cryptogamic. Naming Plants not Cryptogamic at sight. The art of describing Plants correctly. (For this living specimens will be provided.)

71. Text Books:—Lindley's School Botany, and Descriptive Botany, (*Bradbury and Evans.*)

72. Candidates will be expected to return four correct answers to questions in Sect. I., and eight in Section II.; each Botanical description standing for one answer. The questions in both sections will have reference exclusively to subjects having some practical application. No one can pass who is not able to answer fairly the questions in Section II., proficiency in which will be rated higher than in Section I. Students are earnestly recommended to practice as much as possible the art of describing plants correctly, and precisely in the manner required by the great Linnæus, whose method is fully explained in "Descriptive Botany," now forming a part of "School Botany." They should also apply themselves diligently to the study of the wild or common hardy garden plants to which they may have access. A knowledge of Field Botany will rank much higher with the Examiner than mere Botany picked up in books.

XVI.—AGRICULTURE.

73. Half-a-dozen questions will be put on the theory and practice of each of the following departments of Agriculture:—(1) The tillage and manuring of the soil; (2) The cultivation of plants; (3) Live-stock management and the meat-manufacture. A certificate will be easily obtained by any one able to direct the labour of the farm, who has also read any of the following standard Agricultural works:—

74. Morton's Cyclopœdia of Agriculture, (*Blackie.*) Stephen's Book of the Farm, (*Blackwoods.*) Johnstone's Agricultural Chemistry, (*Blackwoods.*) Low's Elements of Practical Agriculture, (*Longmans*).

XVII.—MINING AND METALLURGY.

75. Candidates should be able to identify with facility the ores of the more common metals, and be acquainted with their chemical compositions. They should also be familiar with the forms of occurrence of the various metallic ores, and the usual methods employed for their extraction and subsequent purification by crushing, stamping, and washing, &c. Underground surveying, principles of ventilation, particularly as applicable to collieries. A knowledge of furnace assaying, and a general acquaintance with the metallurgy of the more important metals.

76. First-class certificates can be given to those only who have either acquired some practical knowledge of mining, or who possess a special acquaintance with the metallurgy of at least one of the useful metals.

77. Text Books:—Dana's Mineralogy (*Trubner and Co.*, Paternoster-row.) Mitchell's Assaying, (*Baillière.*) Manual of Metallurgy, (*Griffin.*) Useful metals and their Alloys, (*Houlston and Wright.*) Ure's Dictionary of Arts, Manufactures, and Mines, (*Longmans.*) Percy's Metallurgy, (*Longmans.*) Metallurgy of Iron, Truran, (*Spon.*)

XVIII.—POLITICAL AND SOCIAL ECONOMY.

78. Text Books:—Jones's Lectures on Political Economy, edited by Whewell. Principles of Political Economy, by John Stuart Mill.

79. Some knowledge of the Commercial, Financial, and Statistical History of the United Kingdom will be required, for which "Porter's Progress of the Nation," "M'Culloch's Commercial Dictionary," and "Merivale's Lectures on Colonisation and the Colonies" (new edition) may be consulted.

N.B.—The Principles of Political Economy, by John Stuart Mill, need be studied only by those who aspire to a first class certificate.

XIX.—DOMESTIC ECONOMY.

80. By this is meant a knowledge of the management of household matters, and the principles on which they are conducted; the "why and the wherefore" of everything under this head. For instance, as regards food, animal and vegetable, how differing in nutriment, &c., cookery, &c.

81. Clothing of various kinds, how best fitted for varying climates, seasons, and occupations, &c.

82. The Sanitary regulations of the house, such as ventilation, warming and lighting, drainage, &c. A knowledge of the weights and measures by which the prices of provisions, &c., are regulated; in fact, how to make the most of a small income.

83. A knowledge also of the principles of the Savings Bank, and of the accumulation of small savings, of the Benefit Society, of present and deferred annuities.

84. Text Books:—A Manual of Domestic Economy, by Tegetmeier, (*Home and Colonial School Society.*)

Household Economy, by Margaret Brewster, (*Constable and Co.*)

Domestic Economy, by Esther Copley, (*Groombridge and Son.*)

XX.—GEOGRAPHY.

85. All candidates will be expected to possess a sound knowledge of Elementary Geography, both physical and descriptive. Such knowledge will of necessity embrace an acquaintance with at least the outlines of the great natural features of the globe, the political divisions of countries, and the localities of towns and other places of importance. This kind of knowledge will be looked for in fuller extent with regard to the British Islands, and the various portions of the British Empire, than in respect of other countries. Among the tests applied to it, will be the making, from memory, a sketch showing the chief features of any particular country in Europe named by the Examiner, and also the sketching a Map of some portion of the British Islands (either the county in which the candidate may be resident, or any particular district that may be preferred by himself). It will not of course be expected that such sketches should possess accuracy of detail, but they should at least show the general direction of coast-lines, mountain-chains, or river-courses, with the localities and names of the principal towns. The map of a part of Britain should embody the chief natural features which the district may include (with the situation of coal-fields, if any), and should have marked upon it localities which are distinguished as seats of manufacturing or commercial industry.

86. In addition to the above, candidates who aim at the highest class of certificate should be prepared to answer questions bearing upon Geography in its relation to the Physical Sciences and the History of Mankind—such questions, that is, as involve a general acquaintance with the subject of Climate, the laws of Meteorology, the Distribution of Plants and Animals over the Globe, the leading outlines of Geology, the Ethnographic Division of the Human race, and the commercial resources of different lands. This kind of knowledge is looked for, not in place of geographical knowledge of a more elementary kind, but as supplementary to the latter, and throughout based upon it.

87. Text Books:—

Manual of Geography, by William Hughes, (*Longmans.*)

Guyot's Earth and Man, (*Parker and Son.*)

Physical Geography, by Sir John F. W. Herschel, (*A. and C. Black.*)

Physical Geography of the Sea, by Maury, (*Philip & Son.*)

Page's Introductory Text Book of Geology, (*Blackwood.*)

The General Atlas (*published by the National Society*).

The School Physical Atlas (*either Johnstone's or that published by the National Society*).

XXI.—ENGLISH HISTORY.

88. English History and English Constitutional History.

Text Books:—The Student's Hume. Creasy's Rise and Progress of the English Constitution.

89. Special subject:—The Revolt of the American Colonies.

Text Book:—The chapters relating to this subject in Lord Mahon's History of England.

XXII.—English Literature.

90. Any two, but not more than two, of the authors in the following list may be taken up for examination:—

Chaucer.—The Knight's Tale.

Shakspere—Macbeth; Julius Cæsar; As you like it.

Milton—Paradise Lost, Books I. to VI.

Pope—Essay on Man—Essay on Criticism—Rape of the Lock.

Addison, &c.—Spectator Vol. VIII.

Tennyson—Idylls of the King and In Memoriam.

Angus—Handbook of the English Tongue, chapter I. to chapter IV.

91. Candidates are recommended to make a very careful study of the text of the authors they may select. The questions on each author will be divided into two sections, the first intended to test the candidate's acquaintance with the text, the second his knowledge of the subject-matter and his critical and literary information. Full marks will not be given for answers in the second section, if those in the first section do not prove satisfactory.

XXIII.—Logic and Mental Science.

92. Logic: Candidates will be expected to answer questions on the different processes of thought, and on the connexion of thought and language. Every Candidate must attempt to analyse examples of reasoning, and to detect fallacies.

93. Text Books:—Whateley's Elements of Logic, or Thomson's Outline of the Laws of Thought.

94. A Candidate for a second or third-class Certificate will be expected to prepare, in addition, any one of the following books which he may select:—Bacon's Novum Organum, Book I. (English Translation); Bishop Butler's Sermons; Paley's Moral Philosophy; Dugald Stewart's Philosophy of the Human Mind, Volume I.

95. A Candidate for a first-class Certificate will be expected to prepare any two of these works which he may select.

XXIV.—Latin and Roman History.

96. Livy, Book viii.

Virgil. Æneid, Book v.

Roman History to the death of Augustus Cæsar.

97. Text Book:—Liddell's History of Rome, in one volume.

XXV.—French.

98. The Examination paper will be divided into three parts.

99. The first will comprise grammatical questions and an extract from a modern French writer to be translated into English. Candidates aiming at a 3rd class certificate should confine themselves to this first part.

100. The second part will comprise an English extract to be translated into French, and a list of idiomatic expressions to be rendered from French into English, or *vice versâ*. This should be done satisfactorily by the candidate who aims at a 2nd class certificate.

101.—In the third part, candidates for a 1st class certificate will have, in addition to a portion of the above, to answer properly (*in French*) some *elementary* questions on the two following subjects:—

1. French literature in the second half of the 17th century, comprising the great writers who were born between the years 1620 and 1640 (from Molière to Racine).

2. The History of France, from the death of Cardinal Richelieu to the Revocation of the Edict of Nantes (1642 to 1685).

102. Books recommended:—Nisard: Histoire de la Littérature Française, (*Williams and Norgate*, London and Ediubro'.) Duruy: Histoire de France, (*Williams and Norgate.*)

XXVI.—German.

103. Schiller's Geschichte des Abfalls der Niederlande.

Schiller's Wallensteins's Tod.

Göthe's Egmont.

Kohlrausch's Deutsche Geschichte.

104. Pieces from each of the above works will be given for translation, at the choice of the candidate. Every candidate must translate one piece. First-class certificates will be given to those only who translate *well* from English into German, and write in German a well-expressed Essay on a subject which will be announced to them when they come up for examination.

XXVII.—Freehand Drawing.

105. In freehand drawing the Candidate will be required to show a practical knowledge of the principles usually applied to the imitation of natural and artificial forms, such as furniture, manufactured articles, ornament, foliage, and the human form.

XXVIII.—Geometrical Drawing.

106. Practical Geometry, or Geometrical Drawing, required by the Mechanist, Engineer, Builder, and all in any way employed in the arts of construction. The Candidate will be examined in Practical Plane Geometry, the construction of right line figures of given areas, and of curve lines required in the arts, &c.; in Practical Solid Geometry, Elementary Problems on the line and plane, and their combinations, the representation by orthographic projection of simple solids from conditions, and in the principles of Development as used in the construction of Maps, &c.; and in Elementary Perspective Projection as far as it is required by the Architect.

107. Text-books:—Geometry, Plane, Solid, and Spherical (*Library of Useful Knowledge*) is especially recommended as a work to be studied on Theoretical Geometry. —Elements of Geometrical Drawing, published for the Committee of Council on Education, 2 parts, (*Chapman and Hall*).—Hall's Elements of Descriptive Geometry for Students in Engineering. Heather's Descriptive Geometry. Also the following French Works, which are mentioned in consequence of the great deficiency of English Works on Geometrical Drawing:—Elémens de Géométrie Descriptive, par S. F. Lacroix; Traité de Géométrie Descriptive, par Lefebure de Fourcy; Nouveau Cours raisonné de Dessin Industriel, par Armengaud, ainé, et Armengaud, jeune, et Amouroux; Bardin's Works on Descriptive Geometry.

XXIX.—Theory of Music.

108. Notation, the modern modes, intervals, time signatures, the stave, transposition, modulation, terms and characters in common use.

109. The Elements of Harmony.

110. Musical History and Biography.

111. Arrangements must be made, in the Previous Examination by the Local Boards, to test Candidates, by oral examination, in their knowledge or appreciation of the *sound* of musical successions and combinations. A form of the test to be used for this purpose by the Local Board at the Previous Examination will be sent by the Council to such Local Boards as may *apply for it*, in due time before the Examination.

PRIZES FOR 1863.

THE PRINCE CONSORT'S PRIZE.

112. His Royal Highness the late President of the Society was pleased to offer annually to the candidate who, obtaining a certificate of the first class in the current year, shall have obtained in that year and the three years immediately preceding it, the greatest number of such certificates, a Prize of Twenty-five Guineas, and this Prize Her Majesty the Queen has graciously intimated her intention to continue. This Prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate from the Society of Arts, setting forth the special character of the Prize, and the various certificates for which it was granted.

GENERAL PRIZES.

*** No Prize in any subject will be awarded to a Candidate who does not obtain a Certificate of the first-class therein.

1. Arithmetic	First Prize, £5. Second Prize, £3.
2. Book-keeping	First Prize, £5. Second Prize, £3.
3. Algebra	First Prize, £5. Second Prize, £3.
4. Geometry	First Prize, £5. Second Prize, £3.
5. Mensuration	First Prize, £5. Second Prize, £3.
6. Trigonometry	First Prize, £5. Second Prize, £3.
7. Conic Sections	First Prize, £5. Second Prize, £3.
8. Navigation and Nautical Astronomy	First Prize, £5. Second Prize, £3.
9. Principles of Mechanics	First Prize, £5. Second Prize, £3.
10. Practical Mechanics	First Prize, £5. Second Prize, £3.
11. Magnetism, Electricity, and Heat	First Prize, £5. Second Prize, £3.
12. Astronomy	First Prize, £5. Second Prize, £3.
13. Chemistry	First Prize, £5. Second Prize, £3.
14. Animal Physiology (in relation to Health).	First Prize, £5. Second Prize, £3. Additional by Gift of Harry Chester, Esq.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
15. Botany	First Prize, £5. Second Prize, £3.
16. Agriculture	First Prize, £5. Second Prize, £3. Additional by Gift of J. C. Morton, Esq.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
17. Mining and Metallurgy	First Prize, £5. Second Prize, £3. Additional by Gift of Sir Thomas Phillips, F.G.S.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
18. Political and Social Economy	First Prize, £5. Second Prize, £3.
19. Domestic Economy	First Prize, £5. Second Prize, £3.
20. Geography	First Prize, £5. Second Prize, £3.
21. English History	First Prize, £5. Second Prize, £3. Additional by Gift of Sir C. Wentworth Dilke, Bart.:— Third Prize, £2; and Three Prizes of Books, value £1 each.
22. English Literature	First Prize, £5. Second Prize, £3. Additional by Gift of Sir C. Wentworth Dilke, Bart.:— Third Prize £2; and Three Prizes of Books, value £1 each.
23. Logic and Mental Science	First Prize, £5. Second Prize, £3.
24. Latin and Roman History	First Prize, £5. Second Prize, £3.
25. French	First Prize, £5. Second Prize, £3.
26. German	First Prize, £5. Second Prize, £3.
27. Freehand Drawing	First Prize, £5. Second Prize, £3.
28. Mechanical Drawing	First Prize, £5. Second Prize, £3.
29. Theory of Music	First Prize, £5. Second Prize, £3.

LOCAL EDUCATIONAL BOARDS.

The following is a List of the places at which Boards have already been formed, with the names of the Secretaries, from whom intending Candidates may obtain information relative to the Examinations:—

Local Boards.	Secretaries.
Aberdeen	Mr. James Sinclair, Mechanics' Institution, Aberdeen.
Airdrie School of Arts, and Mechanics' Institution.	Mr. Boyd M. McCrae, Airdrie.
Aldershot District	Mr. Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot.
Ashford	Mr. F. Garaway, Schoolmaster, Ashford New Town.
Bacup	Mr. Thos. Newbigging, Bacup.
Banbury	Mr. John H. Beale, Banbury.
Barnet	Mr. John Thimbleby, Barnet.
Belfast	Rev. Wm. Julius McCullagh, Ballysillan, Belfast.
Berkhampstead	Mr. J. R. Crawford, M.A., Master of Grammar School.
Birmingham and Midland Institute	Mr. Thos. Martineau, Solicitor, Cannon-st., Birmingham.
Bishop's Stortford	Mr. F. Woodham Nash, B.A., Sion House, Birchanger, Bishop's Stortford.
Blackburn	Mr. J. H. Margerison, Blackburn.
Blandford	Mr. Jas. B. Green, Architect and Surveyor, Salisbury-street, Blandford.
Bradford	Mr. M. H. Walls, 66, Victoria-street, Bradford.
Brighton (for Sussex)	Mr. Barclay Phillips, 75, Lansdowne-place, Brighton.
Bristol	Mr. J. F. R. Daniel, Athenæum, Bristol.
Brompton (near Chatham)	Mr. J. Greenleaf, 8, Prospect-row, Brompton, Chatham.
Bucks and Berks Adult Education Society, Windsor	Rev. Thomas Rooke, M.A., St. Alban-street, Windsor.
Bury (Lancashire)	Mr. Edward Bunting, Athenæum, Bury.
Bury St. Edmund's	Mr. John Jackson, Head Master of the Commercial School, Bury.
Canterbury	Rev. Edward Gilder, M.A., Canterbury.
Carlisle Church of England Association	Mr. Thos. Harris, Stationer, 51, Castle-street, Carlisle.
Carlisle Mechanics' Institute	Mr. W. A. Williamson, Mechanics' Institute, Carlisle.
Chelmsford	Mr. Edwin Adams, M.R.C.P., Guildford-ter., Chelmsford.
Croydon	Mr. Francis Warren, Bookseller, 131, High-street.
Darlington	Mr. Geo. S. Gibbs, Haughton-le-Skerne, Darlington.
Deptford	Mr. Thomas Earland, 2, Wellington-grove, Greenwich-road, S.E.
Derby	Mr. H. M. Holmes, Hon. Local Sec. to the Society of Arts, London-road, Derby.
Devonport	Mr. Wm. Mogg and Mr. Samuel Chapple, Mechanics' Institute, Devonport.
Faversham	Mr. Frederick W. Monk, Managing Director of the Faversham Institute.
Glasgow, Athenæum	Mr. Moses Provan, Accountant, 110, West George-street, Glasgow.
Glasgow, Institution	Mr. John Craig, F.E.I.S., Glasgow Institution, 37, Cathedral-street, Glasgow.
Glasgow, Mechanics' Institution	Mr. James Thomson, 48, St. Enoch-square, Glasgow.
Glasgow, Popular Evening Classes, Andersonian University	Mr. Robt. B. Smith, Teacher of English and Classics, Andersonian University, 37, Garnethill-street, Glasgow.
Greenwich	Mr. Jas. Spencer, 3, Wintown-place, Greenwich, S.E.
Halifax, Mechanics' Institution	Mr. A. C. Foster, Solicitor, 1, Westgate, Halifax.
Halifax, Working Men's College	Mr. Geo. Gibb, Haley Hill, Halifax.
Hartlepool (West)	Mr. Thos. Preston Brunton, Solicitor, West Hartlepool.
Hertford	Mr. John Marchant, jun., Port-vale, Hertford.
Hitchin	Mr. Joseph Pollard, Highdown, near Hitchin.
Holmfirth	Mr. J. Batley, South-lane, Holmfirth.
Ingrow-cum-Hainworth	Mr. Jackson, Ingrow-cum-Hainworth.
Ipswich	Mr. Herbert Wright, 44, Handford-road, Ipswich.
East Lancashire Union of Mechanics' Institutions, Burnley	Mr. John Sutherland, Post-office, Burnley.
Leeds West Riding Union	Mr. Barnett Blake, Agent of the Yorkshire Union of Mechanics' Institutions. Mr. John Pickering, Secretary of the Leeds Mechanics' Institution.
Leeds Young Men's Christian Association	Mr. Mark Scott, 9, East-parade, Leeds.
Leicester	Rev. D. J. Vaughan, St. Martin's Vicarage, Leicester.
Lichfield	Rev. S. C. Hamerton. Lichfield.
Liverpool	Rev. A. Hume, D.C.L. and LL.D., 24, Clarence-street, Everton.
Lockwood	Mr. Alfred Lee, Mechanics' Institution, Lockwood.
London Mechanics' Institution	Mr. T. A. Reed, 11, Chancery-lane, W.C.
„ Polytechnic Institution (Limited)	Mr. R. G. Hancock, Polytechnic Institution.
„ City of London College, Sussex Hall, London, E.C.	Mr. W. H. Hansen, City of London College, Sussex Hall, Leadenhall-street, E.C.
„ St. Stephen's, Westminster	Mr. Samuel Elliott, Emery Hill's School, Rochester-row, Westminster, S.W.
„ St. Thomas, Charterhouse, Evening Classes	Rev. R. Holme, 7, Charterhouse-square, E.C.
Louth	Mr. Benjamin Crow, Mechanics' Institution, Louth.
Lynn (King's)	Mr. T. Burton, 23, South Everard-street, Lynn.
Macclesfield	Mr. D. B. Curwen, Park-lane, Macclesfield.
Manchester	Mr. Edwin Simpson, Manchester Mechanics' Institution.
Middlesbro'	Mr. William Taylor, Mechanics' Institute, Middlesbro'.
Newbury	Mr. T. Gurney, Newbury.
Newcastle-on-Tyne Church of England Institute	Mr. Joseph Forster, St. John's School, Newcastle-on-Tyne.

Newcastle-on-Tyne Mechanics' Institution......	Mr. Adam Carse, 18, Mosley-street, Newcastle.
Nottingham	Dr. W. Tindall Robertson, Nottingham.
Oldham	Rev. John Hodgson, Queen-street, Oldham.
Paisley	Dr. W. B. McKinlay, Paisley.
Pembroke Dock...........	Mr. Augustus Wiele, H.M. Dockyard, Pembroke Dock.
Peterborough	Mr. C. T. Cotton, Long-causeway, Peterborough.
Poole	Mr. Robert Belben, Accountant, Longfleet, Poole.
Richmond	Rev. W. Bashall, A.M., 3, Cambridge-villas, Richmond-hill, S.W.
Rotherham	Mr. Frederick Edwards, Solicitor, Rotherham. Mr. M. H. Habershon, Holmes, near Rotherham.
Salford........................	Mr. William Noar, Borough Treasurer, Town Hall, Salford.
Scarborough	Mr. William Barry and Mr. Thomas Shields, Town Hall, Scarborough.
Selby	Mr. William Allison, Bank Manager. Selby.
Sheerness	Mr. Wm. Welch, 1, Cavour-terrace, Alma-road, Marine-town, Sheerness.
Sheffield	Mr. T. Rowbotham, People's College, Sheffield.
Skipton	Mr. George Kendall, Skipton.
Southern Counties' Adult Education Society	Rev. R. Fitzgerald, Winslade, Basingstoke.
South Staffordshire Union of Educational Institutes	Mr. J. Jones, The Trindle, Dudley.
Thirsk..........................	Mr. G. Baker, Market-place, Thirsk.
Wakefield	Mr. John Masterman, Mechanics' Institution, Wakefield.
Warminster	Mr. Frank Morgan, Warminster.
Waterford	Mr. James Budd, Thomas-street, Waterford.
Wellingborough...........	Mr. Thos. S. Curtis, Wellingborough.
Wigan..........................	Mr. James Seward, Diecon-son-street, Wigan.
Wirksworth	Mr. William Tomlinson, Mechanics' Institute, Wirksworth.
Worcestershire, Union of Educational Institutes .	Rev. W. Walters, Hanley-grange, Upton-on-Severn.
York	Mr. Charles Cumberland, Institute of Popular Science, York.

APPENDIX.

This Appendix, which is attached to the separate copies of the Programme printed for distribution,[*] contains the forms that will be forwarded at the proper time to the Local Boards, but as these do not differ materially from those of last year, they are not here reprinted in the *Journal*. The Appendix also contains the List of Prizes and Certificates Awarded, and the Tables of the results of last year's Examinations, with the remarks of the Examiners. These have already appeared in the *Journal*, pages 489, 513, 523.

ASSOCIATION FOR PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the Executive Committee of the Association, held at the offices, 41, Corporation-street, Manchester, on Wednesday, July 30th, William Fairbairn, Esq., C.E., F.R.S., in the chair, Mr. L. E. Fletcher, chief engineer, presented his monthly report, of which the following is an abstract:—

"During the last month there have been examined 323 engines and 563 boilers. Of the latter, two have been examined specially, one internally, 95 thoroughly, and 465 externally, in which the following defects have been found:—Fracture, 16 (2 dangerous); corrosion, 46 (8 dangerous); safety-valves out of order, 11 (1 dangerous); water gauges ditto, 19 (4 dangerous); pressure gauges ditto, 14; feed apparatus ditto, 11; blow-off cocks ditto, 28 (1 dangerous); fusible plugs ditto, 6; furnaces out of shape, 10 (3 dangerous); blistered plates, 7; total, 168 (19 dangerous). Boilers without glass water gauges, 12; without pressure gauges, 2; without blow-off cocks 50; without back pressure valves, 98.

"Three explosions occurring during the past month, to boilers not under the inspection of this Association, have come to my knowledge. One of these took place in Manchester, the other in the neighbourhood of Newcastle, and the third in London, while all three were attended with fatal consequences. The plates of the first are reported as having been found on subsequent investigation so reduced by corrosion, as not to have exceeded the thickness of a sheet of paper; while it is worthy of remark, with regard to the second, that its explosion had seriously damaged another boiler alongside of it, which, however, fortunately happened at the time to be out of work, or, from the injuries it received, it must have exploded in turn. This is frequently found to be the case, and the fact is of interest, as affording an indication of the variety of forces developed by explosion, which, as has been previously pointed out, evidently cannot be summed up merely in that of disruption and the reaction consequent on unbalanced pressure.

"In addition to the above, however, it becomes my duty to report the occurrence of an explosion to one of the boilers belonging to a member of this Association, and which, it is to be regretted, was attended with loss of life to the fireman.

"This is the third fatal explosion which has happened to any of the boilers under the inspection of this Association since its establishment, nearly eight years ago, to which should be added three cases of collapse of furnace flues, not attended with any serious consequences, and which arose in two instances, if not in all three, from shortness of water. During this period, 656 dangerous defects have been pointed out in the boilers under inspection, from which serious injury might have arisen in each case; while, upon limited inquiry only, it has been found that no less than 202 fatal explosions have occurred in that time to boilers not under the inspection of this Association, which have been attended with the loss of 438 lives, in addition to serious injury to 476 persons, and considerable damage to property.

"The explosion last referred to occurred to one of a pair of ordinary cylindrical double-flued boilers, working side by side and connected together. Both boilers were upon mid-feathers, and were of precisely similar construction and dimensions, the length of each being 34 feet, the diameter of the shells 7 feet, of the flues 2 feet $7\frac{1}{2}$ inches, and the thickness of plates $\frac{3}{8}$ths of an inch throughout, with the exception of the flat ends, which were $\frac{9}{16}$ths of an inch. The fittings consisted in each case of a glass water-gauge; a back pressure and feed stop-valve combined; a blow-out valve, of mushroom construction, opening against the pressure in the boiler; and a lever safety valve, loaded with a single weight to a pressure of 35 ℔. per square inch; in addition to a steam pressure gauge common to both boilers as long as both junction valves were open, but not otherwise.

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[*] Copies may be had gratis on application to the Secretary of the Society of Arts.

"The explosion was occasioned by a rent in the shell, which took place directly through the line of rivets, at one of the longitudinal seams in the second ring of plates from the front of the boiler, the seam being on the right-hand side, three feet from the centre or 'keel' line at the bottom. The construction of the seam was such that the edge of the outer plate was uppermost.

"The cause of the rent was thinning of the plates at this seam, by external corrosion, through which it had become reduced to about $\frac{1}{16}$th of an inch in thickness. The corrosion extended throughout the length of the seam, which was 2ft. 6in., and affected the plates on both sides of the lap to a width of from four to 6 inches. The rent did not extend longitudinally beyond the limit of this ring of plates, but ran along the transverse seams of rivets on each side of it, almost severing a complete belt from the boiler. The reaction from this opening raised the boiler momentarily almost on end, as was attested by the character of the fracture of the connections, the indentations in the bottom plates, and the fact that a pipe, previously overhead, had become buried beneath it, while the twin boiler along side was blown bodily in a lateral direction. Had the longitudinal seams of the rivets, instead of breaking joint, been in line, which is too frequently the case, the rent would certainly have run from one end of the boiler to the other, and the destruction of property, and very probably that of life also, have been most serious.

"This defect was one that could scarcely have escaped detection on a careful examination of the condition of the plates in the external flues. Still, it should be borne in mind that the plates of boilers set on mid-feathers are neither as accessible nor as visible as they are in those set on two side walls with a split flue. The side flues in the latter case admit of coming face to face with the plates and seams in a manner which cannot be done in the former, in which many of them can only be seen obliquely at a very great disadvantage, while those at the upper part of the flue, in what may be termed the tip of the wing, are frequently out of reach altogether.

"All the members must be aware that, for the express purpose of detecting such defects as the above, the association affords, in addition to the external inspections, the opportunity of having every boiler 'internally and thoroughly' examined at least once a year. The importance of these 'thorough' examinations has been repeatedly called attention to, and every opportunity taken to promote their being made, and, in order to suit the convenience of members as to time, the ordinary routine of visits is entirely set aside at holiday times, such as Whitweek, Christmas, Easter, and race weeks, so that the inspectors may exclusively devote themselves to this special service.

"It is much to be regretted that the Association was not afforded the opportunity of making a 'thorough' examination of this boiler, either in the year 1860 or 1861, and, when in consequence of attention being specially called to this omission, our inspector, at the request of the owners, visited the works last Easter, the boiler was found unprepared, the flues being imperfectly swept, and the plates coated with soot, although the visit had been expressly appointed, in order to effect a 'thorough' examination. Under these circumstances, no satisfactory examination could be made, which was distinctly stated to the engineer at the time, and subsequently officially reported to the owners. So clearly was this understood, that the next time the boiler was stopped the manager of the works went up the flue himself in order to complete the examination, which the want of preparation had previously prevented our inspecter from doing.

"It is hoped that our members will see from this the absolute necessity of having their boilers prepared for examination. They certainly cannot fail to remember how constantly this has been pressed upon their attention. A note referring to it appears at the foot of every notice forwarded to them of the inspector's proposed visit, and another in the report on his examination, while reference was made to the subject in the chief engineer's monthly report for June, sent to each member; and, in addition, attention is frequently called by special letter, as it was in the present instance. Had it not been for its practical importance, so much had not been said upon so uninteresting a subject, and apology has sometimes been felt necessary for its frequent introduction. Still, dry or not dry, it is often a question of explosion or no explosion.

"Yet another word before dismissing this subject. To expect an inspector to wait while the flues are being swept, as is too frequently the case, is really unreasonable, and compliance could only result in the accommodation of one member at the expense of another, while it would induce such disorder and breach of appointments as would only lead to a general dead-lock, especially in such a thronged time as every holiday week is, when the inspectors have one continuous string of engagements for these 'thorough' examinations, from its beginning to its close, many of them being fixed for more than a month previously.

"It may be added that the engineer who lost his life had been in the habit of going up the flues every month after they had been swept, and yet did not detect the corroded seam. This either shows that the corroded plate was concealed from view in some way in which it was impossible to account for after the explosion, or else is a witness to the necessity of competent inspection. That sweeps cannot be trusted to do engineering work is also clear."

Home Correspondence.

RECREATION AT MECHANICS' INSTITUTES.

Sir,—I should like to see in the *Journal* some letters on this subject from other parts of the kingdom. It is beginning to excite attention, and its importance is being appreciated at several Institutes. The managers feel convinced of the necessity of doing something in this direction, and are anxious to obtain as much evidence as possible of the result of the experiments that have been made. Local secretaries should not confine their communications to an occasional copy of an annual report, but, through the columns of the *Journal*, make known their experience, their wants, and also their opinions. By such interchange of information the connection with the Society of Arts would be made practically available for mutual advantage.

During the winter season, when the long evenings render warmth and light, comfortable rooms and social converse, great sources of attraction, there are many ways in which an Institute might provide for the innocent recreation of large numbers, who, for want of such an inducement, are not now brought within its influence. Perhaps the simplest form is convenience for games of skill, such as chess, draughts, &c. At Huddersfield the committee refused to allow these amusements to be continued, because they discovered that some of the young men made bets on the results of the games. This, however, was a very narrow view to take of the question, banishing all the good on account of, perhaps, a minimum of the evil accompanying all human institutions. Wagers might certainly be forbidden, but a breach of the regulation need not involve a forbidding of chess, which requires an active exercise of the mental powers. Bût, while admitting games of skill, games of chance should not be permitted.

Music, both vocal and instrumental, affords a never-failing source of attraction to both sexes, of all ages, either as performers or listeners. In Leeds the Working Man's Institute finds that a concert, with a charge for admission as low as one penny, will induce the attendance of thousands, with, it is to be hoped, some beneficial effects from the humanising influence of sweet sounds; and though this may be practicable only where a very large building can be obtained, there are other means of accomplishing the same end. The committee of the Institute should make active exertions to establish classes for the practice of vocal as well as instrumental music. The Tonic Sol Fa system is an excellent method of training many voices to sing in unison, and their rehearsals will give delight to themselves and others. There is no lack of material, and taking sacred music, which is by far the most useful, for its improving effect upon religious services, the pupils might commence with the simplest chants, and continue their labour of love in perfecting their vocal powers until they are able to accomplish the magnificent choruses of Handel.

There are many who take delight in the performance of some musical instrument, and a class for the study and practice of this art, under a competent teacher, would in many places be a powerful attraction to an Institute. At all their public meetings and festive gatherings, the performances of a good brass band would be of great service, and the perseverance requisite for the attainment of skill would be stimulated by occasional friendly contests with the bands of other Institutes. At Beverley Mechanics' Institution the brass band plays at the commencement and end of each lecture, so as to vary as well as to increase the attraction, and there are many opportunities for rendering such services beneficial.

But besides these, music may be made to play a very important part in weaning our working population from the insidious and destructive temptations of the public-house, if it be made easily accessible by a low charge for admission. It need not, however, be all the entertaintainment afforded, for instruction might be judiciously blended, and he who paid but a penny to be regaled with sweet sounds, could hardly complain if for ten minutes or a quarter of an hour, as a breathing interval for the musicians, he had to listen to an address in advocacy of mental cultivation, or the reading of some portion of English literature, in which the pursuit of praiseworthy objects was indirectly inculcated.

A discussion class, if it comprised but a few members who argued the questions with a reasonable amount of ability, might, by its weekly meetings being open, prove a valuable aid to the Institution. The publication of a list of questions suitable for discussion has removed many of the difficulties which formerly existed to the carrying on of such a class, and no doubt much may still be done to render this method of exciting intellectual rivalry still more attractive. None but members of the class should be allowed to take part in the proceedings, but as the condition of membership should only be the liability to introduce a subject for discussion by the reading of a short essay, there are many who would be tempted to join the class from a desire to offer their opinions upon a subject in in which for the time at least they might feel an interest.

Popular readings, to which the public are admitted at the charge of a penny, have proved so successful at Ipswich and some other places, that little need be said in their advocacy. Not only are they attractive from the introduction of entertaining literature, but they may be made really useful by varying that which is amusing with that which is instructive. Biography, when it illustrates the conquest of difficulties by perseverance, is often more profitable as an incentive to imitation than direct precept; and many a tale, though ostensibly designed for amusement, conveys lessons which can hardly fail of producing some good fruits. The mere names of English authors whose works might be read with advantage, would form a long catalogue, but no library of any pretensions can be without abundant materials.

Another mode, which was practiced with some success at an Institute near Manchester, was for each member in turn to read some portion of a well-known author. This was followed by a discussion, in which the members criticised not only the author, but the manner in which the work had been read. The effect was to improve the members in the art of reading—no mean accomplishment—many of them becoming very proficient. In a a small colliery village near Leeds, where a reading room was established last year, much advantage was gained by one of the members reading to the others. This was done almost every evening, and the effect was to induce many to attend who would otherwise have been in the public house. I am, &c.,

BARNETT BLAKE.

Leeds, Aug. 18, 1861.

Proceedings of Institutions.

Barnstaple Literary and Scientific Institution.—The seventeenth annual report congratulates the members upon the fact that the Institution has been making a decided, though gradual, advance in most of its departments. While the progress of the year has been attended by features of an encouraging character, it has been marked by one circumstance which will affect in an important manner the patronage of the Institution. The death of the late lamented Earl Fortescue, ever since the foundation of the Institution its honoured president, renders that office vacant; and the council cannot refer to this sad event without placing on record their estimate of his high and noble character. By the vacancy which thus occurs, an opportunity is afforded to the members of this Institution of recognizing the immense benefits which have been conferred on them by the munificence of Mr. Rock. The council, therefore, suggest that Mr. Rock be elected to the office of president, confident that such claims as those of our benefactor and patron will only be duly met by the bestowal of the highest compliment which it is in the power of the members to offer. In the library the council have continued to make improvements in the arrangement of the books, and in other details, and the total issues of the year are in excess of the average. The reading rooms have been supplied, as heretofore, with the leading newspapers, magazines, and serials of the day. The council have much pleasure in being able to make a more gratifying report of the past lecture session than in some former years. Still much remains to be accomplished in order to place the lecture department of the Institution on the footing which so important a branch of educational operations should obtain. To the attainment of excellence in this department, the co-operation of gentlemen of scientific and literary endowments resident in the neighbourhood is necessary, as the funds of the Institution would be inadequate to the necessary provision without it. Such has of late, from whatever cause, been withheld, with a few exceptions; but the council earnestly invite the assistance of residents who may be qualified to aid in this work. The report of the classes this year is, when compared with some former years, very satisfactory. Fewer classes have, it is true, been formed, but they have been attended more numerously and regularly, and more tangible and appreciable results have followed. The drawing class has been undertaken this session by Mr. Alexander Lauder, who enlarged the sphere of study, introduced chalk drawing from models, and obtained very satisfactory results. He has also established a class for design, and a competition has taken place for prizes offered by Mr. R. W. Cotton and Mr. Tamlyn. The drawing class opened with 25 members, who were soon increased to 35; when it was found expedient, owing to the narrowness of accommodation, to close the class. After testing the attainments of the students, and ascertaining their probable future vocations, they were divided into two classes for free-hand and mathematical drawing. The talent and progress of the class for free hand drawing soon developed a third class for drawing from the round in pencil and crayon, and the remarkable progress of the class in so short a period of time is very encouraging. A supplementary design class was also formed with the advanced students, who received a given subject, and at their homes were expected fortnightly to produce their original conception of the subject given. In the mathematical class the first evening of the session found 21 young men willing to attend. This number increased to 37, giving an average attendance of 24·4 for the session. On subjecting the class to an individual examination, it was discovered that their attainments were of a very rudimentary character, many being ignorant even of the relative value of the digits. Earnestness characterised the majority, which has been evidenced by their regularity and diligence, and especially by their readiness to supplement the ordinary class studies by problems worked out at home. One great want soon apparent was, a power to express their results neatly and logically; to remedy this a written monthly examination was instituted. The papers were then valued, and a class list produced and publicly exhibited in the class room; thus, in addition, creating a healthy stimulus amongst the young men. On comparing the papers in the earlier examinations with the more recent ones, marked progress is evidenced. The average out of the maximum of 100 reached in November was 60·9, the average for February 98·1. A class for the study of the French language has been taught by Mons. Rœttger, and has been attended by an average amount of success. The meteorological department still continues under the superintendence of Mr. Mackrell; two observations daily have been taken by the librarian, and registered during the last two years, which has given greater precision to the results thus obtained. At the solicitation of a member of the Meteorological Society, London, Mr. Galton, a third observation has been supplied to him reduced to sea level, taken simultaneously with other observers, at 9 o'clock, p.m., during the month of December last, the object of this night observation being to assist in furnishing data for the construction of a set of synchronous weather charts, with illustrated diagrams, a copy of which is to be presented to each contributor. The council in a former report stated respecting the museum that it "might be said to have so far failed as to justify the belief that it would be expedient to abandon it altogether." Shortly after this course had been decided on, a valuable collection of geological and mineral specimens was presented to the Institution by Mrs. Hill. A museum of local geology and mineralogy is thus likely to be formed. The balance-sheet shows that the receipts have been £316 0s. 1d., and that there is a balance in hand of £8 16s. The following is a list of lectures delivered:—Dr. Daniell: "The Fall of the First French Empire;" "Hundred Days of Napoleon the Great;" Rev. W. Tarbotton: "On Ghosts;" Rev. G. Waterman: "The Wonders of the Microscopic World;" Henry Jordon, Esq.: "Queensland, the New Colony of Australia;" The Torrington Glee Union: A Concert; George Buckland, Esq.: A Musical Entertainment, entitled "Scenes and Incidents from English History." The issue of books and periodicals amounts to 10,042. There are in the library 5,123 volumes, of which 103 have been added during the past year. The number of members is 341.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par
Numb.

Delivered on 25th July, 1862.

426 Scottish Universities—Papers.
433. Chelsea Bridge—Return.
442. Registration of Titles, &c. (Ireland)—Return.
443 Constabulary (Ireland)—Return.
223. Bills—Bankruptcy Act (1861) Amendment.
230. „ Writs Prohibition.
231. „ Tralee Savings Bank (No. 2.)

Delivered on 26th and 28th July, 1862.

428. East India (Oude Claims)—Return.
358. Dwelling Houses, &c. (Scotland)—Return.
436. Gold Coin and Treasure—Returns.
440. Ceylon—Return.
447. Poor Relief (Lancashire, &c.)—Return.
444. Standing Orders Revision—Report from Committee.
437. Local Taxation Returns Act—Paper.
232. Bills—Night Poaching Prevention (amended).
233. „ Burial Boards (Mortgage of Rates).
234. „ Council of Medical Education.
235. „ Coal Mines, Lords Amendments.
236. „ Police and Improvement (Scotland), Lords Amendments.
237. „ Elections (Ireland)—Lords Amendments.
238. „ Industrial and Provident Societies, Lords Amendments.
232 (a.) Night Poaching Prevention, Amendments to be moved by Sir George Grey.

Delivered on 25th July.

Public General Acts—Cap. 31 to 35.

Delivered on 29th July, 1862.

419. Annuities—Account.
431. East India (Sale of Waste Lands, &c. Dissents)—Return.
431 (1.) East India (Sale of Waste Lands, &c. Instructions)—Return.
434. Coinage—Accounts.
435. Australian Colonies (Imports)—Return.
438. Durham University—Papers.
445. Maltsters—Returns.
449. Army Prize Money—Account.
229. Bills—Stipendary Magistrates (as amended in Committee, and on Re-commitment).
240. „ Union Relief Aid (amended).

Delivered on 30th July, 1862.

45 (6.) Trade and Navigation Accounts (30th June, 1862).
451. Barrack Masters—Return.
461. Barrack Masters (Military Store Keepers)—Return.
424. Skibbereen and Castletown Boards of Guardians—Return.
239. Bills - Thames Embankment, Lords Amendments.
241. „ Poaching Prevention (as amended in Committee, and on Consideration of Bill, as amended).
242. „ African Slave Trade Treaty (No. 2).
243. „ Companies, &c., Lords Amendments.
244. „ Parochial Assessments, Lords Amendments.
245. „ Metropolis Local Management Acts Amendment, Lords Amendments.
246. „ Confirmation of Sales, &c.
Public General Acts—Cap. 36 to 46.

Delivered on 31st July, 1862.

454. East India (Breach of Contracts Bill)—Return.
456. Unclaimed Wreck—Returns.

Session 1861.

492. Chaplains in Workhouses—Return.

Delivered on 1st August, 1862.

307 (A 2.) Poor Rates and Pauperism—Return (A.)
459. Stipendary Magistrates (Ireland)—Return.
247. Bills—Union Relief Aid (as amended in Committee, and on recommitment).
248. „ County Surveyors (Ireland), Lords Amendments.
249. „ Highland Roads and Bridges, Lords Amendments.

Copies of the under-mentioned Papers, presented by Command, will be delivered to Members of Parliament applying for the same at the Office for the Sale of Parliamentary Papers, House of Commons:—

52. Convict Prisons—Reports.
53. Reformatory Schools—Fifth Report.

Delivered on 2nd and 4th August, 1862.

452. Fisheries (Ireland)—Return.
453. Thames Conservancy—Paper.
465. Land Improvement Act (Ireland)—Return.
409. Population and Representation—Returns.
446. Fortifications—Account of Moneys raised and issued, &c.
460. Hops—Returns.
481. Supply and Ways and Means (Session 1862)—Return.
482. Redundant List (Public Departments)—Return.
251. Bills—Lunatics Law Amendment, Lords Amendments.
252. „ Charity Commissioners' Jurisdiction, Lords Amendments.
253. „ Poor Removal, Lords Amendments.

Delivered on 5th, 6th, and 7th August, 1862.

458. Civil Services—General Abstract of the Grants for 1862-3 and 1861-2.
179. Public Health—Fourth Report of the Medical Officer of the Privy Council.
464. Naval Prize Money, &c.—Account.
466. Income and Property Tax—Returns.
473. Baronies (Ireland)—Return.
480. Registration of Deeds (Ireland) Act—Return.
462. Standing Orders of the House of Commons.
China (Employment of Officers in the Naval or Military Service of Her Majesty)—Correspondence.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 15th*, 1862.]

Dated 3rd June, 1862.

1676. J. Fincham, Beck-row, Mildenhall, Suffolk—An arrangement or arrangements of mechanism useful for facilitating the repairing of roads and ways, also applicable for the tilling of land.

Dated 17*th July*, 1862.

2043. M. Kurts, 151, Bishopsgate-street Without—A new or improved material to be used in the manufacture of handles for umbrellas, parasols, and walking sticks.
2045. H. Appleby, Tavistock-place, Plumstead—Imp. in armour plates for ships of war, floating and land batteries, and other like purposes.
2047. J. Schloss, Cannon-street—Imp. in pouches.
2040. T. B. Daft, 2, Queen-square, Westminster—Imp. in the manufacture of vulcanised india-rubber thread.

Dated 18*th July*, 1862.

2055. J. S. Jarvis, Wood-street—Imp. in shirt collars.
2057. C. A. Day and T. Summers, Southampton—Imp. in sheer legs.

Dated 19*th July*, 1862.

2059. G. J. Yates and J. W. W. Tindall, Liverpool—A process of deodorising paraffin, coal, pitch, rock, and other like oils and hydro-carbons.
2061. R. A. Brooman, 166, Fleet-street—Imp. in revivifying animal black, in apparatus employed therein, and in recovering a product employed in the revivification. (A com.)
2063. A. Pratt, Devonshire-place, Wandsworth road—Imp. in self-capping fire-arms.
2065. W. E. Newton, 66, Chancery-lane—Imp. in machinery for preparing fibrous substances for combing. (A com.)
2067. W. Tranter, Birmingham—Imp. in fire-arms.

Dated 21*st July*, 1862.

2970. E. Bazin, Angers, France—An improved electric railway carriage signal.
2073. A. M. Fell, Auchanard, Linlithgow, N.B.—Imp. in obtaining or manufacturing sulphate of ammonia and manure.

Dated 22*nd July*, 1862.

2077. T. Meriton, Hamburgh—Imp. in steam engine governors and speed regulators for machinery.
2079. P. F. Cassegrain, Paris—Imp. in fire arms.
2081. Dr. W. Smith, Over Darwen, Lancashire—Certain imp. in power-looms for weaving.
2085. W. Crofts, New Lenton, near Nottingham—Imp. in the manufacture of fabrics by lace machinery, and in the means or apparatus employed therein.
2037. H. R. Summons, Navarino-terrace, Dalston-road—Imp. in machinery for bordering envelopes, paper, and cards.
2089. G. Payne, Grantham—Imp. in horse shoes.
2091. A. C. Vautier, Paris—Imp. in obtaining fibrous materials, and fibrous and textile fabrics, and in producing agents used in part of the invention.

Dated 25*th July*, 1862.

2116. W. Clark, 53, Chancery-lane—Imp. in rafts or structures applicable for the ordinary purposes of marine and inland navigation, as also for saving life in cases of shipwreck or othewise. (A com.)

Dated 29*th July*, 1862.

2152. G. Waldie, Linlithgow, N.B.—Imp. in colour printing, and in the machinery or apparatus employed therein.

Dated 30*th July*, 1862.

2162. W. Wanklyn, Bury—Imp. in apparatus for opening and conditioning East Indian and other tightly compressed cottons.

Dated 31*st July*, 1862.

2170. E. F. Prentiss, Birkenhead, and R. A. Robertson, Liverpool—Imp. in obtaining products from rock oil, coal tar, and other like mineral substances in a more or less pure and deodorised state, and in the apparatus to be used therefor, and which is also applicable to distillation in general.
2172. J. Ransom and E Ransom, Kempston, Bedfordshire—Imp. in mounting mill stones.

Dated 1*st August*, 1862.

2178. J. Sinclair, Glasgow—Improved arrangements for ventilating, and in part applicable for fumigating.
2180. G. Haseltine, 100, Fleet-street—Imp. in apparatus for drying grain, gunpowder, and other granular substances. (A com.)
2182. J. C. Onions, Birmingham—Imp. in portable forges.
2184. J. E. Marsh, Birmingham—An imp. or imps. in metal rivets used in joining or securing together parts of boots, shoes, and other articles of leather, and also in machinery for making such rivets.

Dated 2*nd August*, 1862.

2188. T. Onion, Calais, France—Imp. in rotary steam engines, and in propellers adapted to propelling vessels in water.
2190. J. Gray, Glasgow—Improved arrangements for cleaning ships' bottoms, and for preventing the fouling thereof.
2192. C. Warne, Syleham Mills, near Scole, Norfolk—Imp. in the manufacture of linen drabbett.

Dated 5*th August*, 1862.

2196. J. Thoma, 35, Poland-street, Oxford-street—An improved self-adjusting screw wrench.
2202. A. Priestley, Huddersfield—Imp. in arrangements or apparatus applicable to locomotive railway engines and carriages for distributing sand upon the rails to give adhesion to the driving and brake wheels of such engines and carriages.

Dated 6*th August*, 1862.

2204. J. C. Richardson, Lichfield—An imp. or imps. in cleaning cotton waste.
2206. W. G. Valentin, Oxford-street, and F. Levick, Blaina, Monmouth—Imp. in the generation of combustible gas for lighting and heating purposes, and in the mode of applying such gases to the manufacture of iron, glass, and other processes in the arts where great heat is required.
2208. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the construction of armour plates for ships and forts, and applicable to other like purposes. (A com.)

Dated 7*th August*, 1862.

2210. C. Culling, Downham Market, Norfolk—Imp. in fire-arms.
2214. R. A. Brooman, 166, Fleet-street—Imp. in ships and vessels, in order to prevent injury from collisions.
2216. W. Clark, 53, Chancery-lane—Imp. in the rig, spars, and sails of ships and other vessels. (A com.)
2212. R. W. Ralph, Honnington-grange, near Newport—Certain imp. in or applicable to reaping machines.

PATENTS SEALED.

[*From Gazette, August* 15*th*, 1862.]

August 15*th.*

410. J. Cooke.
413. J. Chatterton & W. Smith.
415. A. H. Harrison.
419. H. Crawford, J. Crawford, R. Crawford, and R. Templeton.
428. R. Watkins.
430. J. Lees.
434. W. Firth.
435. C. T. Marzetti and J. Watson.
436. J. T. Pendlebury and G. Pendlebury.
441. N. Symons.
443. W. Hinton.
444. W. Davis.
445. J. Paterson.
448. J. Willcox.
450. J. Friedlaender.
455. J. Paterson.
456. J. Paterson.
457. C. Wood.
459. J. Spence.
464. E. S. Crease.
465. R. Pickin & W. E. Pickin.
467. W. McAdam & W. Chrystal.
469. H. Chavasse, T. Morris, and G. B. Haines.
479. D. B. White.
483. W. B. Johnson.
505. W. Clark.
525. W. Miller.
527. W. Clark.
547. J. C. Ratliff.
585. J. Gjers.
601. E. Partington.
643. W. J. Bennett.
751. T. Dunn.
1182. A. Robertson and R. Barter.
1473. C. Attwood.
1651. W. E. Newton.
1653. W. E. Newton.
1798. J. H. Johnson.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, August* 19*th*, 1862.]

11*th August.*

1867. D. Campbell.
1936. T. Briggs.

13*th August.*

1939. H. Smith & T. W. Ashby.
1991. J. Chatterton.
2341. F. Levick.

14*th August.*

1946. J. M. Hetherington.
1972. G. Collier.

15*th August.*

1993. W. Wilson.
1941. A. P. Chamberlain.
2965. H. O. Robinson.

16*th August.*

1893. H. Medlock.
1908. J. Fowler, jun., R. Burton and D. Greig, jun., E. E. Allen, and W. Worby.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, August* 15*th*, 1862.]

July 29*th.*

1747. A. Allan.

[*From Gazette, August* 19*th*, 1862.]

29*th July.*

1747. A. Allan.

11*th August.*

1871. G. Collier.
2058. J. C. G. Kennedy.

13*th August.*

1841. G. Sanders & R. E. Donovan.

14*th August.*

1848. S. Statham and W. Smith.

15*th August.*

1867. W. E. Baker.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4499	Aug. 8	Cornice Pole and Curtain Rod	Samuel Walker, jun.	Birmingham.
4450	,, 9	Instrument for finding the Centres of Ovals and Circles, and dividing them into equal parts	Messrs. Herrington and Hall..	William-street, Clerkenwell, E.C.
4451	,, 11	Fastening for Brooches, Pins, Links, and Articles of Jewellery	Samuel Phillips	Birmingham.
4452	,, 14	Screw Wrench or Spanner	Thomas Wilson	Birmingham.